

Bio-Potential Activation of Artificial Muscles

Abstract

The invention relates to the general field of electrical activation of non-biological artificial muscles, such as ionic polymeric synthetic artificial muscles, by means of action potentials produced by a biological nerve, such as mammalian sciatic nerve,. This invention demonstrates how to stimulate and activate a non-biological muscle such as an ionic polymeric metal composite (IPMC) electro-active artificial muscle with the biological action potential generated by a mammalian nerve such as a rat sciatic nerve. The said invention further presents settings to generate optimal movement and force in artificial muscle due to the application of a nerve action potential. The invention uses the sciatic nerve to generate an action potential, which is subsequently amplified and applied to a cantilever sample of an electro-active ionic polymeric artificial muscle to cause it to bend, flex, and twitch. The sciatic nerve, in this invention, is stimulated by a separate signal to cause it to generate an action potential in the range of hundreds of μV , which is recorded by the electrodes attached to the nerve. These

electrodes carry the action potential to an amplifier to amplify it to between 10's of Volts and subsequently are attached to the ionic polymeric artificial muscle to cause it to flex and twitch. Different frequencies of stimulation are tried to optimize the motion and force generated by the polymeric artificial muscles.